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SOUTHERN COMPANY
Energy to Serve Your World℠

September 22, 2008

Docket No.: 50-366

NL-08-1448

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant – Unit 2
Submittal of Additional Information to Support Proposed Exemption to
10 CFR 50.46 and 10 CFR 50 Appendix K to Allow Ziron Fuel Cladding

Ladies and Gentlemen:

Southern Nuclear Operating Company (SNC) submitted an exemption request for the referenced subject in letter NL-08-0590, dated May 2, 2008 and provided additional supporting information requested by the NRC in letter NL-08-1250, dated August 8, 2008. Also, SNC and Global Nuclear Fuel (GNF) were requested in a subsequent teleconference with the NRC to review the previously submitted GNF technical information in our letter NL-08-0590 to determine if the amount of information indicated as proprietary could be reduced. GNF has revised the reports, as requested, and by this letter SNC submits revised GNF technical reports, proprietary and non-proprietary, that are responsive to NRC's request.

Enclosure 1 contains the Global Nuclear Fuel Affidavit of September 11, 2008 and the authorization to apply for withholding. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b) (4) of 10 CFR 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information, which is proprietary to Global Nuclear Fuel, be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. Enclosure 2 contains information proprietary to Global Nuclear Fuel, which is supported by the affidavit signed by Global Nuclear Fuel, the owner of the information. Enclosure 3 contains the nonproprietary version of Enclosure 2. The designation of proprietary information in Enclosures 2 and 3 has been revised by GNF.

(Affirmation and signature are provided on the following page.)

Mr. M. J. Ajluni states he is a Manager-Nuclear Licensing of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments. If you have any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Mark J Ajluni

M. J. Ajluni
Manager, Nuclear Licensing

Sworn to and subscribed before me this 22 *day of* September, *2008.*

Charlotte A. Graham
Notary Public

My commission expires: 6/9/12

MJA/WRM/daj

Enclosures:
1. Global Nuclear Fuels – Americas Affidavit dated September 11, 2008
2. GNF-0000-0079-7396P, "Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant," September 2008 (Proprietary)
3. GNF-0000-0079-7396NP, "Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant," September 2008 (Nonproprietary)

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. D. R. Madison, Vice President – Hatch
Mr. D. H. Jones, Vice President – Engineering
RTYPE: CHA02.004

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Hatch
Mr. J. A. Hickey, Senior Resident Inspector – Hatch

State of Georgia
Mr. N. Holcomb, Commissioner – Department of Natural Resources

Edwin I. Hatch Nuclear Plant – Unit 2
Submittal of Additional Information to Support Proposed Exemption to 10 CFR 50.46 and 10 CFR 50 Appendix K to Allow Ziron Fuel Cladding

Enclosure 1

Global Nuclear Fuels – Americas Affidavit dated September 11, 2008

Global Nuclear Fuel – Americas
AFFIDAVIT

I, Andrew A. Lingenfelter, state as follows:

(1) I am Vice President, Fuel Engineering, Global Nuclear Fuel – Americas, LLC ("GNF-A"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in GNF Report, GNF-0000-0079-7396P*, Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant, September* 2008. The proprietary information in GNF Report, GNF-0000-0079-7396P*, Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant, September* 2008*,* is identified by a single [[dotted underline inside double square brackets{3}]]. Figures and other large objects are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 11th day of September 2008.

Andrew A. Lingenfelter
Vice President, Fuel Engineering
Global Nuclear Fuel–Americas, LLC

Edwin I. Hatch Nuclear Plant – Unit 2
Submittal of Additional Information to Support Proposed Exemption to 10 CFR 50.46 and 10 CFR 50 Appendix K to Allow Ziron Fuel Cladding

Enclosure 3

GNF-0000-0079-7396NP,
"Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant - September 2008"
(Nonproprietary)

Global Nuclear Fuel

A Joint Venture of GE, Toshiba, & Hitachi

GNF-0000-0079-7396NP
Class I
DRF 0000-0079-7396
September 2008

Non-Proprietary Information

Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant

INFORMATION NOTICE

This document is a non-proprietary version of GNF-0000-0079-7396P, which has the proprietary information removed. Portions of the document that have been removed are indicated by double open and closed brackets as shown here [[ ]].

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT PLEASE READ CAREFULLY

The information contained in this document is furnished solely for the purpose(s) stated in the transmittal letter. The only undertakings of GNF with respect to information in this document are contained in contracts between GNF and participating utilities, and nothing contained in this document shall be construed as changing those contracts. The use of this information by anyone other than those participating entities and for any purposes other than those for which it is intended is not authorized; and with respect to any unauthorized use, GNF makes no representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

Technical Basis Supporting GNF-Ziron Lead Test Assembly Introduction into the Hatch Nuclear Plant

I. Purpose:

Southern Nuclear – Southern Company (SNC) and Global Nuclear Fuel (GNF) intend to establish an option for use of GNF-Ziron fuel cladding in the Edwin I Hatch Nuclear Plant (Units 1 and 2). This document describes the licensing basis for using GNF-Ziron in Plant Hatch to obtain operating experience with GNF-Ziron cladding material. It is proposed that this operating experience be obtained through irradiation of two GE14 Lead Test Assemblies with selected rods (~30 rod in each assembly) clad with GNF-Ziron in Plant Hatch Unit 2 during Cycles 21, 22 and 23. The purpose of this document is to provide the technical bases to support SNC's request for exemption to cladding-specific requirements of 10 CFR 50.46, and 10 CFR Part 50 Appendix K. In addition, this document also discusses the licensing approach to meeting the requirement in Reference 1 that lead test assemblies be analyzed with approved methods.

II. GNF-Ziron Characteristics and Properties

GNF-Ziron is a zirconium-based alloy that is a slight modification to Zircaloy-2, which is widely used in the BWR industry as the material for fuel rod cladding and other fuel assembly components. The primary compositional difference is in the iron content of GNF-Ziron, which is selected to be above the range for Zircaloy-2 as specified in the ASTM B350 industry standard. GNF-Ziron has an [[ ]] compared with a 0.20-wt% upper limit for Zircaloy-2. For Zircaloy-2, the ASTM standard B350 describes the compositional requirements on Sn, Fe, Cr and Ni as the major alloying elements, but the oxygen content is not defined. Since the late 1980s, GNF has employed a tighter set of specifications for Zircaloy-2, termed controlled-chemistry (CC) Zircaloy-2. A comparison of the minimum and maximum compositions for ASTM and GNF's CC Zircaloy-2, and GNF-Ziron is given in Table 1.

Table 1
Comparison of the minimum, maximum and typical compositions for ASTM Zircaloy-2, GNF's CC Zircaloy-2, and GNF-Ziron

wt%	Zircaloy-2					GNF-Ziron		
	ASTM		Controlled Chemistry					
	Min	Max	Min	Max	Typical	Min	Max	Typical
Sn	1.20	1.70	[[			[[		
Fe	0.07	0.20						
Cr	0.05	0.15						
Ni	0.03	0.08						
O	per PO							
FeCrNi	0.18	0.38						
Zr	97.9	98.6			]]			]]

As Table 1 shows, GNF-Ziron is similar to both ASTM and CC Zircaloy-2, in that all three types of alloy are based on ~98wt% of zirconium with alloying additions consisting of Sn, Fe, Cr and Ni. GNF-Ziron differs from ASTM and CC Zircaloy-2 primarily in that the iron content is increased. It should be noted that the indicated composition range for GNF-Ziron is [[

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Table 1 also shows the typical or expected target compositions for GNF's CC Zircaloy-2 and GNF-Ziron. It is noted that the difference in the target/typical [[ ]] This small compositional difference is due to the increased iron content at the expense of the base zirconium, while the ranges of the other alloying additions are intended to be unchanged. As a comparison, this compositional difference is small compared to the changes associated with recent introduction of other new cladding materials in the PWR sector to replace Zircaloy-4, a zirconium based alloy similar to Zircaloy-2 but without nickel and with 0.18 – 0.24wt% iron and 0.07 – 0.13wt% chromium.

The material properties that are inputs to approved methods for evaluating the performance of fuel rods during various operating conditions (e.g. normal operation, LOCA) were evaluated and will be documented in a Licensing Topical Report (LTR) to be submitted to the NRC. The contents of the LTR are discussed further in the next section. A number of properties or characteristics for GNF-Ziron were obtained through testing; these are listed in Table 2. A number of other properties are governed by the major alloy element zirconium and are therefore not sensitive to small changes in the alloy composition; these properties are provided in Table 3.

Based on the evaluation of properties in Tables 2 and 3, GNF concludes that the properties of GNF-Ziron are [[ ]] One notable feature of GNF-Ziron is a lower propensity to absorb corrosion-released hydrogen, despite a similar corrosion performance compared with Zircaloy-2. This reduced tendency to absorb hydrogen is the primary reason to consider GNF-Ziron as a fuel rod cladding material.

Table 2
Material Characteristics and Properties Assessed Based on Test Data

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Table 3
Material Properties Expected to be Nearly Identical to Zircaloy-2 Based on Similarity in Composition

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III. Reload Licensing Strategy

A. Current GNF-Ziron Status in the GE14 Licensing Basis

GE14 fuel is licensed according to criteria and requirements specified in GESTAR II (General Electric Standard Application For Reactor Fuel, NEDE-24011-P-A), as reported in the GE14 compliance report (GE14 Compliance With Amendment 22 of NEDE-24011-P-A, NEDC-32868P, Rev. 2). The GE14 compliance report states that the GE14 fuel cladding and water rods are made of Zircaloy-2. Because the composition of GNF-Ziron deviates slightly from the ASTM-specification ranges for Zircaloy-2 (ASTM Standard B350 for UNS60802), as described in the previous section [see also Table 1], the application of the GE14 licensing basis to GE14 fuel with GNF-Ziron material must be addressed.

B. Two-Phase Approach

GNF proposes to approach the licensing basis for introduction of GNF-Ziron fuel cladding in two phases, which were discussed in a LTR pre-submittal meeting with the NRC during July, 2007 [FLN-2007-026, Subject: Ziron and Additive Fuel Pre-Submittal Meeting, Final Presentations July 24, 2007]. Phase 1 consists of GNF preparing and submitting a LTR. The LTR will address the application of GNF-Ziron to GNF Fuel Designs for reload applications. This submittal is necessary because GNF-Ziron is not addressed in the GE14 compliance report, which stated Zircaloy-2 as the cladding material, and because GNF-Ziron cannot be considered as Zircaloy-2, as discussed above. This LTR will compare the properties of GNF-Ziron with those of Zircaloy-2 [[ ]] The LTR will include evaluations of potential differences in compliance with design limits when GNF-Ziron properties are used as inputs to approved methods. Once approved by the NRC, this LTR together with the GE14 compliance report will permit the application of GNF-Ziron on a reload basis for the GE14 fuel design, and accordingly, the GE14 compliance report will be revised to include the use of GNF-Ziron. Phase 1 will not invoke

advantages of GNF-Ziron, i.e. reduced hydrogen absorption, and will retain [[ ]] currently applied to GE14 Phase 2, the schedule for which remains to be determined, will require the submittal to the NRC of a separate LTR on GNF-Ziron that will address [[ ]] In addition, Phase 2 [[

]] Application of the second GNF-Ziron LTR and [[

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IV. Lead Test Assemblies (LTA) Program at Plant Hatch

GNF and SNC are proposing a Lead Test Assembly (LTA) irradiation program at Plant Hatch to provide in-reactor experience with the GNF-Ziron cladding in GE14 fuel. (The LTAs may also include GNF-Ziron [[ ]] however, they are not discussed further in this report since they are not specifically addressed in 10 CFR 50.) This operating experience, along with the revised GE14 compliance report to be issued following the approval of the GNF-Ziron LTR, will form the basis for future reload applications of GE14 fuel clad with GNF-Ziron at Plant Hatch.

SNC has agreed to irradiate two GE14 LTAs with selected rods (~ 30 rods in each assembly) clad with GNF-Ziron in the Plant Hatch Unit 2 reactor during Cycles 21, 22 and 23. Specific locations of the GNF-Ziron fuel rods in the LTAs have not been determined yet; however, it should be noted that the nuclear configuration of the LTAs would be the same as one of the reload 20 fuel batches. SNC has informed GNF that use of GNF-Ziron cladding is not prevented by the Plant Hatch Technical Specifications; therefore, subsequent to NRC-approval of this submittal, loading the LTAs into the Hatch-2 reactor will be evaluated as a change to the Plant as required by 10 CFR 50.59. GNF will provide SNC with technical information to support this evaluation. Consistent with the approach used for the GNF-Ziron LTR, the evaluations of the LTAs will be performed using GESTR-Mechanical (GESTR-M) (Acceptance of Referencing of Licensing Topical Report NEDE-24011-P-A Amendment 7 to Revision 6, GE Standard Application for Reactor Fuel Letter, C.O. Thomas (NRC) to J.S. Charnley (GE), MFN-036-85, March 1, 1985) and other approved methods.

V. Review of Methods

As described in Reference 1 “As long as the analysis of the LTAs using approved methods meets the approved criteria, it would be concluded that no unreviewed safety question exists.” GEH/GNF currently performs fuel rod thermal-mechanical design and licensing analyses with the GESTR-M code and its associated application methodology. A key part of the statistical methodology is the inclusion of model uncertainty based upon the GESTR-M qualification results. This prediction uncertainty, couched in terms of a corresponding uncertainty in [[ ]] In addition to this model uncertainty, [[

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Fuel rods are designed such that, if they are operated within their specific thermal-mechanical operating limits of power versus exposure (LHGR limits), all licensing and design criteria are explicitly satisfied. The LHGR limits are specified to ensure compliance with the primary fuel rod thermal-mechanical licensing and design constraints.

The primary thermal-mechanical licensing parameters that may be impacted by the introduction of a new cladding material such as GNF-Ziron are:

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An assessment of the impact of the Ziron cladding for each of these parameters has been performed. The conclusion from the assessment was that, [[

]] implementation of GNF-Ziron will have no detrimental impact on thermal-mechanical licensing limits or margins.

In addition to the thermal-mechanical design limits associated with GESTR-M, GNF uses a number of other NRC approved methods to demonstrate compliance with other design limits. GNF has evaluated the potential impact of incorporating GNF-Ziron properties into these methods (nuclear, thermal hydraulic, safety limit MCPR, transient analyses, stability, ATWS, rod drop accident, channel bow, and LOCA) and concluded there is no significant impact on the use of these methods as a result of this change. This conclusion is consistent with [[

]] The assessment will be provided in the LTR, which will be submitted to the NRC.

VI. Technical Basis for Exemptions to 10 CFR 50.46 and Part 50 Appendix K

Title 10 of the Code of Federal Regulations (10 CFR) Part 50.46, “Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors,” requires that the calculated emergency core cooling system (ECCS) performance for reactors with Zircaloy or ZIRLO fuel cladding meet certain criteria. 10 CFR Part 50 Appendix K, “ECCS Evaluation Models,” further requires that the Baker-Just equation be used in the ECCS evaluation model to determine the rate of energy release, cladding oxidation, and hydrogen generation after a postulated loss-of-coolant accident (LOCA). The Baker-Just equation presumes the use of Zircaloy or ZIRLO fuel cladding. There is no provision for cladding material other than Zircaloy or ZIRLO in 10 CFR 50.46 and Part 50 Appendix K. Exemptions to 10 CFR 50.46 and Part 50 Appendix K are therefore required for the use of GNF-Ziron as the cladding material.

In 10 CFR 50.46 and within the Baker-Just equation, no differentiation is made between types of Zircaloy, specifically between the commercially available Zircaloy-2 and Zircaloy-4. The underlying reason is that differences in composition between the two types of Zircaloy are not sufficient to result in significant differences in the high temperature oxidation characteristics. As noted in Section II, the composition of GNF-Ziron deviates only slightly from that of Zircaloy-2. The behavior and properties of GNF-Ziron during and after a postulated LOCA [[

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10 CFR 50.46 has requirements related to the maximum cladding oxidation, peak cladding temperature, maximum hydrogen generation, coolable geometry and long-term cooling. High temperature oxidation tests have been conducted [[ ]] to demonstrate the applicability of the Baker-Just equation to GNF-Ziron and the results are

shown in Figure 1. Figure 1 shows that the use of the Baker-Just equation remains conservative in the postulated LOCA circumstances relative to the measured GNF-Ziron data. The maximum cladding oxidation and peak cladding temperature limits are collectively known as the embrittlement criteria. In order to address the potential embrittlement due to absorbed hydrogen associated with a postulated LOCA, [[

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The predicted ECR values were calculated using the Baker-Just equation. The test results showed that [[

]] The test results thus indicate margin to embrittlement relative to the 17% ECR clad oxidation limit stated in 10 CFR 50.46.

As noted in Section II, the Fe content of GNF-Ziron deviates only slightly from that of Zircaloy-2, while the alloy compositions are otherwise the same. Consequently, a significant change in the hydrogen generated from cladding-water reaction is not expected. Moreover, in the context of the proposed LTAs for Hatch Unit 2, any core-wide change in hydrogen generation due to a change from Zircaloy-2 to GNF-Ziron would be further diminished by the fact that only two assembles will be involved and that each assembly will contain a fraction of GNF-Ziron rods. Additionally, the composition change is only in increased Fe content relative to Zircaloy-2, the change in essence replaces some zirconium atoms with iron atoms. The potential effect on hydrogen generation due to replacing one Zr atom with a Fe atom can be estimated as follows. Each Zr atom will react with two H_2O molecules to form stoichiometric ZrO_2, thereby releasing 4 hydrogen atoms. Since Fe has a lower valence than Zr, each Fe atom can result in the release of 2, 3, or 2.67 atoms of hydrogen depending on whether stoichiometric Fe0, Fe_2O_3 or Fe_30_4, respectively, is formed from the reaction with water. The expected result of replacing one Zr atom with one Fe atom is therefore a reduction in the number of released hydrogen atoms. Thus, because of the similarity in composition between Zircaloy-2 and GNF-Ziron, evaluation of hydrogen release based on GNF-Ziron cladding is conservatively bounded by the calculation based on Zircaloy-2 cladding. Furthermore, any difference in calculated hydrogen generation would be slightly less for the GNF-Ziron case.

The coolable geometry criterion is generally addressed through high temperature perforation tests. A comparison of test data obtained from GNF-Ziron with available data for Zircaloy-2 is shown in Figure 2, which shows that the high temperature perforation characteristics, and hence coolable geometry evaluation, for GNF-Ziron [[

]] because of the similar composition.

The similarity in composition with Zircaloy-2 and the high temperature test results described above thus demonstrate with a high degree of confidence that the underlying requirements of 10 CFR 50.46 and Part 50 Appendix K are met when GNF-Ziron is used as the cladding material. Therefore, there is no anticipated decrease in coolability or increase in dose consequences as a result of a postulated LOCA for GNF-Ziron relative to evaluations performed assuming Zircaloy cladding.

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Figure 1
Weight gain data for GNF-Ziron[[ ]] compared with Baker-Just

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Figure 2
Perforation hoop stress of GNF-Ziron cladding compared with Zircaloy-2 data

VII. Summary

10 CFR 50.46 and Part 50 Appendix K explicitly state or implicitly assume the cladding material to be zircaloy or Zirlo. In order to allow the development and in-reactor testing of a fuel cladding material which is neither zircaloy nor Zirlo, it is necessary to request the NRC grant exemptions to 10 CFR 50.46 and Part 50 Appendix K for the Plant Hatch LTAs containing GNF-Ziron cladding. Based on the similarity in composition with Zircaloy-2 and the high temperature test results, the underlying requirements of 10 CFR 50.46 and Part 50 Appendix K are shown to be met with a high degree of confidence when GNF-Ziron is used as the cladding material.

[[ ]] GNF has concluded that evaluations based on the currently approved methods (including GESTR-M) for fuel rod performance during various operating conditions, including accidents, are fully applicable to GE14 fuel bundles with GNF-Ziron fuel rod cladding. The GE14 LTAs with selected rods clad with GNF-Ziron to be inserted in Plant Hatch Unit 2 reactor during Cycles 21, 22 and 23 will be evaluated using existing approved methods utilizing the equivalency in properties.

VIII. References

1. NRC Letter, " Lead Test Assembly Licensing," T. A. Ippolito (NRC) to R. E. Engel, September 23, 1981.